

INDICATIVE SYLLABUS FOR THE POST OF JUNIOR ENGINEER

SKILL/TRADE TEST (50 MARKS)

1. Work procedure as per CPWD guidelines.
2. Knowledge of computer applications (like MS-Word, Work Excel, Power Point and E-Mail, etc.)

WRITTEN TEST (100 MARKS)

Part-A (General) 50 marks

a) **General Awareness:**

Questions will assess the candidate's general awareness and knowledge of current affairs, as well as matters of everyday observation expected of an educated person. The syllabus will include India and its neighbouring countries, with emphasis on History, Indian Polity and Constitution, Art and Culture, Geography, Economics, General Policy, Science and Scientific Research. Questions may also cover National and International Organisations/Institutions, important events, and current developments.

b) **General Intelligence & Reasoning:**

The test will include questions of both verbal and non-verbal reasoning. The syllabus will cover analogies, similarities and differences, classification, series, spatial visualization, problem-solving, analysis, judgment, decision-making, visual memory, observation, discrimination, relationships, concepts, arithmetical reasoning, verbal and figure classification, and arithmetical number series, etc.

c) **Quantitative Aptitude:**

The syllabus will cover Number System, Simplification, Decimals and Fractions, LCM and HCF, Ratio and Proportion, Percentage, Average, Profit and Loss, Discount, Simple and Compound Interest, Mensuration, Time and Work, Time and Distance, Tables and Graphs, and other basic quantitative concepts.

d) **Test of English language:**

The test will assess the candidate's understanding and correct usage of the English language, including Vocabulary, Grammar, Sentence Structure, Synonyms, Antonyms, One-word Substitution, comprehension, and other aspects of correct usage of English.

e) **Computer Awareness:**

The syllabus will cover Computer Fundamentals, basic applications of computers, components of computers, word processing, spreadsheets, Internet and web applications, networking, and basic information and communication technology (ICT).

Part-B (Specialization) 50 marks

a) **Structural Engineering & Mechanics:**

- **Engineering Mechanics:** Forces (resolution, moments, systems, composition), equilibrium, friction, centroid, center of gravity, and simple machines.
- **Mechanics & Theory of Structures:** Stress & strain, shear force & bending moment diagrams, moment of inertia, stresses in beams, trusses, strain energy, direct/bending stresses, slope & deflection, fixed/continuous beams, moment distribution method, and columns.

- **Concrete Structures (RCC):** Working Stress & Limit State methods; analysis and design of singly/doubly reinforced sections, T-beams, slabs, axially loaded columns, and footings; shear, bond, and development length.
- **Steel Structures:** Steel sections/grades, IS Codes, connections, design of tension/compression members, steel roof trusses, beams, and column bases.

b) Geotechnical & Fluid Mechanics:

- **Geotechnical Engineering:** Physical properties of soil, permeability, seepage, shear strength, bearing capacity, compaction, stabilization, site investigation, and subsoil exploration. Application in foundations, pavements, retaining walls, and earthen dams.
- **Hydraulics (Fluid Mechanics):** Fluid properties, hydrostatic pressure, pipe pressure measurement, fluid flow fundamentals, flow through pipes & open channels, flow measuring devices, and hydraulic machines.

c) Infrastructure & Transportation Engineering:

- **Highway Engineering:** Road investigation, geometric design, pavement materials/construction, traffic engineering, hill roads, drainage, and maintenance.
- **Railway Engineering:** Alignment, gauges, permanent way, track geometrics, branching, stations/yards, and maintenance.
- **Bridge & Tunnel Engineering:** Bridge site selection, components, temporary/permanent structures, and maintenance. Tunnel shapes, surveying, tunneling methods in various strata, lining, and ventilation.
- **Irrigation Engineering:** Hydrology, reservoir planning, percolation tanks, and diversion headworks.
- **Environmental Engineering:** Water supply, domestic sewage, solid waste management, air/noise pollution control, plumbing, and sanitation.

d) Materials, Construction & Management:

- **Building Materials & Concrete Technology:** Stones, bricks, mortars, timber, plastics, metals (steel, aluminium, GI), bitumen, PVC/CPVC. Cement grades, aggregate properties, fresh/hardened concrete (W/C ratio), quality control (batching to curing), admixtures, and special concretes (RMC, pre-stressed, FR, precast).
- **Construction Practice & Finishes:** Job layout, earthwork, foundations (dewatering, cofferdams), masonry (stone, brick, hollow block, composite), cavity walls, doors/windows, stairs/lifts/escalators, scaffolding, shoring, flooring, plastering, painting, and RCC roofing.
- **Advanced Techniques & Equipment:** Artificial timber, underwater/tremix concreting, advanced formwork, prefabricated construction, soil reinforcement, earthmoving machinery, mixers, crushers, pile drivers, and bitumen plants.
- **Maintenance & Drawing:** Building drawing conventions, planning principles/bye-laws, drawing views (plan, section, elevation, perspective), crack repair (grouting, epoxy), settlement remedies, and re-baring.
- **Estimating, Costing & Contracts:** Approximate and detailed estimates, rate analysis, modes of measurement, tenders/tender documents, engineering contracts, payments, and specifications.

e) Surveying & Digital Tools

- **Surveying:** Chain, cross-staff, compass, levelling (dumpy, tilting, auto level), contouring, area/volume metrics, plane table, theodolite, tachymetric surveying, curves, advanced equipment, aerial survey, and remote sensing.
- **Computer-Aided Design (CAD):** CAD software (AutoCAD, Auto Civil, 3D Max), command workflows, 2D generation (plans, sections, elevations, area statements), and 3D visualization.